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Daily Tornado Frequencies for the Contiguous United States

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The Severe Local Storms (SELS) forecasters of the National Severe Storms Forecast Center maintain a log of all reports of severe storms. The log was started in 1956, when the SELS unit was established, in an intensified effort to collect nationwide tornado data for the evaluation of the SELS unit product. Reports are logged as soon as they are received, then corrected and updated as further information is available. This log for the 11-yr period 1956 through 1966 was used to determine a daily tornado frequency for the area of the contiguous 48 States.[1] Any day on which one or more tornadoes were reported anywhere within the contiguous United States was tabulated as a tornado day, using days of the year as 1 through 365 and omitting February 29. Storm touchdown times were converted to Central Standard Time for consistency, and the touchdown time determined the day. The number of times (of 11 possible) that each calendar date had one or more tornadoes was subjected to a Fourier analysis, with the following reduction of variance (percent):

First harmonic	82. 2
Second harmonic	1. 8
Third harmonic	0. 0
Fourth harmonic	0. 1

[1] The cutoff year of 1966 was the latest complete year of checked data conveniently available at the time these calculations were first planned (to be used for another purpose)

The first two harmonics thus account for 84 percent of the variance. The plot of these two harmonics combined, along with the observed frequencies, is given in figure 1. The maximum frequency given by these two harmonics occurs on day 172 (June 21) with a frequency of 9.85 (probability 90 percent), while the minimum occurs on day 364 (December 30) with a frequency of 1.21 (probability 11 percent). Thus, while the second harmonic explains only about 2 percent additional variance, it causes the maximum or minimum (or some of each) to shift 10 days from the perfect symmetry of the first harmonic, but the difference from a single sine curve is not easily detectable by eye. One can also see from the curve that the frequency is significantly different from zero on every day of the year. The variance of the predicted values of the curve from the observed values is 1.74 (16 percent).

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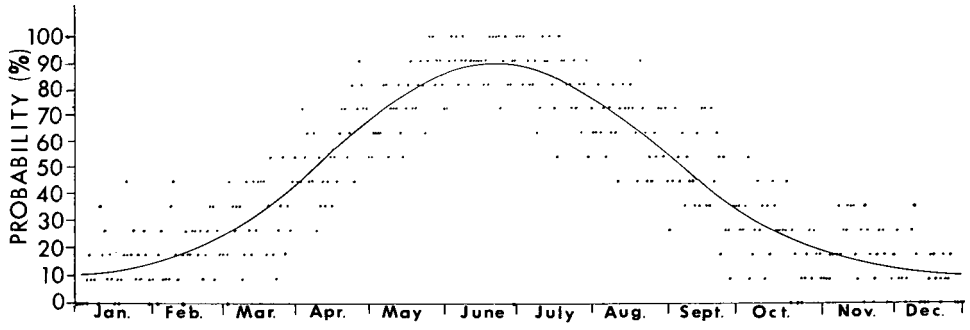

FIGURE 1.—Daily probability of one or more tornadoes in the contiguous 48 States.

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